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Effects of mental training on psychological preparation and basketball performance

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EFFECTS OF MENTAL TRAINING ON PSYCHOLOGICAL PREPARATION AND BASKETBALL PERFORMANCE

by

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An Abstract

of a thesis submitted in partial fulfillment

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ABSTRACT

Females (N = 9) from an NCAA Division III basketball team served as subjects to test the effectiveness of a season-long mental training (MT) program on psychological preparation and basketball performance. Subjects completed repeated measures of the Psychological Skills Inventory for Sports (PSIS) and the Profile of Mood States (POMS) throughout the season. The treatment for experimental group subjects involved relaxation training, affirmation statements, mental recall, mental rehearsal, concentration training, and goal setting. One-way ANOVAs demonstrated no statistically significant group differences in basketball performance. Mixed Model ANOVAs on the PSIS data revealed significant Group x Time interactions for the concentration and confidence subscales. The experimental group demonstrated positive trends in the development of concentration and confidence throughout the study. Mixed model ANOVAs on the POMS data showed a significant Group x Time interaction for the fatigue subscale. Inspection of the experimental group data pattern revealed a gradual lowering of fatigue throughout the study. The MT program had minimal statistically significant effects on the psychological preparation and basketball performance of this study's small sample, but the

basketball performance and psychological preparation data revealed enough interesting trends to warrant further investigations.

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A Thesis Presented to the Faculty of
the Division of Health, Physical
Education, and Recreation
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Requirements for the Degree
Master of Science

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by
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Ithaca College
Division of Health, Physical Education, and Recreation
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CERTIFICATE OF APPROVAL

MASTER OF SCIENCE THESIS

This is to certify that the Master of Science Thesis of

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submitted in partial fulfillment of the requirements for the degree of Master of Science in the Division of Health, Physical Education, and Recreation at Ithaca College has been approved.

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Chapter 1

INTRODUCTION

The desire of players to improve and the importance of sport in our society have combined to place enormous pressures on athletes to succeed. With respect to competitive athletics, many technological advances (e.g., the fiberglass vaulting pole) have enabled athletes to perform at higher levels. Reports of athletes using ergogenic aids such as steroids, amphetamines, and more recently, blood doping, are too numerous to count. However, the recent development of the science of sport psychology has provided coaches, athletes, and sport psychologists with a less risky, yet viable option. Intervention strategies that focus on the psychological aspects of sport are gaining respect as performance enhancement techniques.

The increased interest in the psychological aspects of sport has led researchers and practitioners to devote more time and energy to the development of effective mental training (MT) programs. Evidence of this trend can be seen in the growing body of knowledge and the abundance of available literature on the various topics of MT (Greenspan & Feltz, 1989; Hall, Rodgers, & Barr, 1990; Kolonay, 1977; Meyers, Schleser, & Okwumabua, 1982; Murphy, 1977; Suedfeld & Bruno,

1990; Wrisberg & Anshel, 1989). In addition, there are numerous books available on the topic of MT in athletics. Although each program is designed in its own unique fashion, there is a universal belief in the importance of integrating the development of the mind and the body. Some standard features are available in most MT programs. For example, the Unestahl (1983) program incorporates the use of self-hypnosis as its relaxation technique. In contrast, Gauron (1984) presents a variety of relaxation procedures and encourages readers to assess which one best fits their needs. Other features of packaged MT programs are as follows: concentration training, cognitive restructuring, imagery, positive affirmation statements, and goal setting. Concentration training and goal setting were also incorporated.

The purpose of this study was to determine the effect of Curtis' (1988) MT program on basketball performance. His program includes relaxation training, affirmation statements, mental recall, and mental rehearsal. In addition, the differential effects of individualized intervention programs were also investigated.

Scope of Problem

The investigator attempted to enhance the athletic performance of women basketball players in competitive

situations through the use of a MT program. Subjects (N = 12) were selected from the 1990-91 Ithaca College women's basketball team. The players ranged in age from 18-22 years. Over a period of approximately 6 weeks, subjects in the treatment condition (n = 5) systematically acquired relaxation, concentration, and visualization skills. Individualized MT programs were designed and then implemented for each experimental group athlete. The dependent measures were individual game statistics, psychological skills for sport questionnaire responses, and mood and affective states questionnaire responses. Descriptive and inferential statistics were calculated on each of the dependent measures to assess treatment effects. The attitudes of players who experienced MT were also assessed.

Statement of Problem

The effects of MT on athletic performance were investigated. The following questions were considered in this investigation:

1. What aspects of basketball performance are affected by MT?

2. Does MT enhance the development of psychological skills for sport?

3. Does MT have a differential effect on state dependent mood scores?

4. What are the players' perceptions of MT?

Significance of Problem

Recent developments in sport psychology have resulted in a change in focus of both research and applied areas. Interests have expanded from the investigation of motivation and personality to psychological training designed to factilitate behavior change (Suinn, 1983). Psychological training and athletic performance is of interest to both coaches and athletes at various competitive levels. Studies have demonstrated basketball performance gains as a result of various MT interventions (Hamilton & Fremouw, 1985; Meyers & Schleser, 1980; Meyers, et al., 1982; Miller & McAuley, 1987; Murphy, 1977). In other psychological skills research (e.g., Seabourne, Weinberg, Jackson, & Suinn, 1985), sport psychologists have specifically investigated the effectiveness of various components of intervention strategies.

Many coaches, athletes, and sport psychologists are currently applying MT techniques to develop psychological skills for performance enhancement. However, there is little empirical evidence available that has evaluated the effectiveness of MT programs. This study will provide practitioners with information regarding MT, psychological skill development, mood control, and performance enhancement.

An important goal of sport psychologists is to

generate belief among athletes and coaches about the importance of psychological skill development. If athletes and coaches do not subscribe to this fundamental belief, all efforts to mentally train athletes for competition will be unsuccessful. Mahoney, Avener, & Avener (1983) suggested that the truly serious athlete must be devoted to the physical dimensions (e.g., conditioning and skill development) and the psychological dimensions (e.g., personal development). Sport psychologists, through their interaction with athletes, have the unique opportunity to facilitate the latter.

Hypotheses

The following hypotheses were investigated in this thesis:

1. The basketball performance of the experimental group will be significantly higher than the performance of the control group, as measured by game statistics.

2. The experimental group will show significantly greater improvements in psychological skills, from pretest to posttest, than the control group.

3. The experimental group will show greater consistency in mood control throughout the season than the control group.

Assumptions of Study

The following assumptions were made in this study:

1. The control group will have access to the materials utilized by the experimental group but they will lack the necessary skills to effectively perform MT.

2. The subjects will respond to the inventories accurately and honestly.

Definition of Terms

1. Cognitive restructuring is an intervention strategy that replaces negative thoughts with positive ones through the use of positive affirmation statements and confidence building techniques.

2. Individual intervention refers to the process of designing and implementing a MT program to meet the specific psychological and physical skill needs of athletes.

3. Mental imagery (i.e., visualization) is an intervention strategy that incorporates the cognitive practice of skills, as opposed to physical practice. Visualization includes mental recall of past events and mental rehearsal of future events.

4. Mental training is defined as the program of intervention strategies utilized to enhance basketball performance.

Delimitations of Study

The following are the delimitations of this study:

1. The subjects were Division III female basketball players from a small college in Central New York state.

2. Game statistics and playing time were the only measures of basketball performance.

3. Psychological Skills Inventory for Sports (PSIS) (Mahoney et al., 1983) was the only instrument used to assess the sport related psychological skills.

4. Profile of Mood States (POMS) (McNair, Lorr, & Droppleman, 1971) was the only measure used to assess mood states.

Limitations of Study

The following limitations were evident in this study:

1. The results of this study may only apply to female basketball players similar to those in the present study.

2. These findings may only be valid when game statistics are used to measure basketball performance.

3. The findings may only be relevant when PSIS is used for assessing psychological skills.

4. The resultant information regarding mood fluctuations may only apply when the POMS is used to measure mood states.

Chapter 2

REVIEW OF LITERATURE

Mental training (MT) is defined as a process by which individuals systematically acquire various psychological skills in order to enhance athletic performance (Porter & Foster, 1986). Several authors have written books designed to facilitate the development of these skills (e.g., Bennett & Pravitz, 1982; Curtis, 1988; Gauron, 1984; Nideffer, 1985; Singer, 1986). In addition, the relationship between psychological skill enhancement and performance outcomes has been widely investigated. In this chapter the investigator reviews the primary MT programs that are available. A secondary purpose is to present the research literature that applies to psychological skills and competitive basketball performance.

Packaged Mental Training

Many factors affect the quality and variability of athletic performance. Although physical abilities are essential components of performance, most MT researchers and practitioners generally agree that it is the level of psychological functioning that separates two athletes of equal physical abilities (Bennett & Pravitz, 1982; Curtis, 1988; Gauron, 1984; Orlick, 1980; Suinn, 1986; Unestahl, 1983). As

demonstrated by the abundance of MT literature, numerous individuals have devoted a significant portion of their lives to the explanation and implementation of psychological skills training programs for performance enhancement (Bennett & Pravitz, 1982; Curtis, 1988; Gauron, 1984; Orlick, 1980; Porter & Foster, 1986; Suinn, 1986). Nevertheless, the relationship between psychological skills and performance is still a complex and ambiguous topic (Mahoney et al., 1983). The research literature shows that various components of pre-packaged and individualized MT programs have shown promise in the enhancement of performance. Pre-packaged programs contain essentially the same elements (e.g., relaxation training, concentration training, cognitive restructuring, and visualization). These programs are organized in different manners depending on the mental trainer (Gauron, 1984). All packaged MT programs reviewed herein are comprised of similar psychological skill-related components. Each program design is summarized and its distinguishing characteristics are highlighted.

According to Gauron (1984), the premise of mental conditioning is that both the mind and the body may have a profound influence on athletic performance. He suggested that all packaged MT programs essentially focus on the development of comparable psychological

skills. In his own MT program, Gauron concentrates on the development of seven psychological skills. The first psychological skill is attentional control through which concentration skills are developed by focusing energy and attention. Second, emotional control is practiced. Athletes are taught to effectively deal with emotions such as anxiety, apprehension, revenge, which can adversely affect performance. Thirdly, relaxation and visualization training are used to achieve self-rejuvenation and energization. Athletes are also encouraged to increase body awareness by becoming more in tune with their own body feelings and physiological processes. Self-confidence, another essential skill, is developed and maintained by repeating affirmation statements. In the fifth step, Gauron advises athletes to program their unconscious minds. By using visualization, athletes may mentally rehearse desired outcomes, prior performances, or problem situations in order to enhance performance. Finally, cognitive restructuring refers to the process of minimizing distortions (e.g., polarized thinking, catastrophizing, and personalization) and irrational ideas by substituting rational thought and positive self-talk.

Suinn's (1986) MT program is similar to Gauron's (1984) because they both incorporate the development of

seven psychological skills. In Suinn's program, Step 1 is the development of relaxation with primary instruction in progressive relaxation. Step 2 focuses on training athletes to recognize, prevent, and control stress. In Step 3, individuals are instructed to attend to the informational content of negative thoughts but to disregard the emotional content. Through positive thought control, the development of a positive self-concept is facilitated. The next step in the MT process, Step 4, involves the development of self-regulation. Athletes are encouraged to utilize both their minds (e.g., perceptions of being ready for an event) and bodies (e.g., physiological sensations such as arousal or tiredness) when attempting to regulate performance states. In Step 5 athletes are introduced to mental rehearsal. Suinn proposes the use of visuo-motor behavior rehearsal (VMBR). VMBR combines relaxation with subsequent visualization. A significant outcome of successful VMBR is that athletes can learn to turn relaxation and visualization scenes on and off at will. Next, athletes are systematically taught how to effectively narrow their focus in order to increase their concentration skills during competition. Lastly, in Step 7 athletes are instructed to recognize and direct their own energy to attain energy control. Essentially, strategies focus on

enabling athletes to maximize the use of their energy potential. Although Suinn's and Gauron's programs are similar in terms of their psychological components (e.g., visualization and concentration), the mental trainers present their programs in a unique and systematic manner.

Bennett and Pravitz (1982), in their MT program, incorporate many of the same psychological aspects as Gauron (1984) and Suinn (1986). Program components include the following: mental relaxation, goal setting, goal programming (i.e., positive affirmations), knowledge, search for harmony, triple imagery, energy flow, and time management. Bennett and Pravitz highlight the relationship between the search for harmony and athletic performance with the following statements. "All living things seek to be in harmony with their own nature. To the degree harmony is achieved, optimal functioning and performance is possible. To the degree harmony is blocked, optimal functioning is impaired" (p. 69). A unique feature of the Bennett and Pravitz program is the search for harmony.

In Orlick's (1980) MT program, he concentrates on helping athletes to maximize their own potential. Basically, the collection of psychological skill building techniques are divided into three sections:

(a) realizing potential, (b) finding paths to excellence, and (c) overcoming obstacles. For athletes to realize their full potential, Orlick recommends that they establish personal meaning with respect to their sport, commit to excellence, focus on relevant tasks, set goals to direct behavior, and maintain a balanced life. Orlick contends that these five strategies will help athletes to more effectively realize their potential. The techniques utilized to achieve excellence include: mental control, mental imagery, relaxation training, distraction control, simulated practice (i.e., game-like situations), Zen training, and self-hypnosis. Zen training, the most distinctive aspect of Orlick's program, is a fundamental approach toward life in which the athlete is urged to become at one with the sporting experience. Finally, in order to overcome obstacles, athletes are given advice on how to prevent panic situations, solve problems with coaches, achieve team harmony, experience losing as a learning situation, combat learned helplessness, control overload, live without sports, and enjoy life. Orlick also emphasized the importance of quality interaction and mutual respect between the athlete and the sport psychologist. With the exception of the Zen approach and the strategies for overcoming obstacles, the techniques presented by Orlick are similar to those of

others (Bennett & Pravitz, 1982; Gauron, 1984; Suinn, 1986).

According to Porter and Foster (1986), MT is the systematic development of psychological skills for the enhancement of athletic performance. They based their MT program on two assumptions. First, they believed that the images that athletes produce in their minds are powerful. Positive images can lead to a positive reality (i.e., outcome), whereas negative images can lead to a negative reality. This assumption is similar to Gauron's (1984) focus on mind-body interaction as it relates to performance. Second, the pictures that athletes create in their minds can have a profound affect on their future. In addition, MT can effectively change belief systems and enable athletes to progress past their self-imposed mental limitations. Similar to other packages, the basic components of the program are (a) goal setting, (b) positive self-statements, (c) progressive relaxation, (d) creative visualization, and (e) log keeping. The authors urge athletes to keep a mental training log so that they can track their progress, both mental and physical. This information can also be used to determine the effectiveness of the overall program. The log keeping component separates this package from those previously presented (Bennett & Pravitz, 1982; Gauron, 1984;

Orlick, 1980; Suinn, 1986).

According to Unestahl (1983), the psychological demands of athletic performance are not dependent on the competitive level of the athlete. Rather, they are essentially the same, regardless of the levels, and are determined more by the demands of the sport in which one is participating. Unestahl developed a dual approach in his implementation of MT strategies with athletic teams. The two-pronged attack is comprised of individual counseling and group dynamics. Individual counseling consists of extensive psychological assessment in the following areas: self-concept, emotional set, achievement motivation, concentration, and anxiety. Additionally, various aspects are incorporated in designing individual interventions, which may include hypnosis, relaxation training, inner mental training, and attentional control. Group dynamics include sociometric testing and individual and group goal setting. Information is also presented to the group regarding the dynamics of forming, storming, norming, and performing. According to Unestahl, after groups form, the members go through a process of establishing an identity (i.e., storming) and setting standards of expected behavior (i.e., norming). Once these processes are complete, then the group is able to begin performing as a cohesive unit. With the

exception of the group dynamics component, Unestahl's strategies parallel those of other researchers (e.g., Gauron, 1984; Porter & Foster, 1986; Suinn, 1986).

Martens (1987) termed his MT approach the Psychological Skills Training (PST) program. This program is taught to athletes using a three-step process. The first part of the process is to educate athletes about the mental skills to be learned. Secondly, the mental trainer needs to facilitate the acquisition of the skills. Finally, the athletes are responsible for systematically practicing and integrating the skills in order to become proficient. Skills involved in the PST program include the following: imagery, managing psychic energy (i.e., controlling arousal levels), stress management, attentional control, self-confidence, and goal setting. Unlike other programs, Martens does not present specific procedural guidelines for the reader to follow when attempting to establish these skills. He does, however, suggest that the key to the effectiveness of PST lies in the enthusiasm and beliefs of the mental trainer.

Harris and Harris (1984) defined mental skill training as "developing strategies which allow you to enter competition with the proper mindset and which will enable you to perform at your most consistent and

highest level" (p. 15). This program is based upon a holistic approach. According to the authors, both the mental and the physical aspects of training need to be emphasized so that athletes may achieve optimal performances. Consistent athletic performances are dependent on the athlete's ability to regulate cognitive skills throughout the competition. Without committing to the development of these mental skills, athletes will not be able to perform consistently.

In Harris and Harris' program, athletes must first thoroughly understand the integrated effects of the mind and body on performance outcomes. Once this foundation is built, athletes may then progress through the seven components of the program. These components are (a) recognition of performance anxiety, (b) relaxation training, (c) concentration training, (d) mental imagery, (e) goal setting, (f) improved communication, and (g) avoidance of obstacles. Athletes may choose from a list of strategies provided by the authors. Although no specific time limitations are given for the acquisition of each psychological skill, athletes are instructed to completely master each skill before progressing to the next level. Skills should be learned and practiced in the order they are presented. After completing their presentation, Harris and Harris also suggested that the

effectiveness of mental skill development becomes apparent only with lengthy practice and application.

Nideffer (1985) initially presented a variety of MT skills for athletes. Then he described his own model, which is designed so that individuals may systematically acquire MT skills. He also suggested that athletes should take their time as they progress through the program. In their eagerness to learn, athletes often progress to the next step without first mastering the previous one. The use of a log or a diary may greatly facilitate the development of all of Nideffer's MT strategies.

The individual components in Nideffer's program are divided into six steps. During Week 1, athletes are instructed to assess their own optimal levels of arousal. According to Nideffer, athletes should monitor their arousal levels in both practice and competitive situations. In Week 2, athletes should identify sources of distraction that may adversely affect performance. Nideffer's model requires that athletes monitor their thoughts and levels of tension. This process, if implemented well, will help athletes determine what factors distract them from the specific task at hand. Next, athletes are asked to identify positive self-images that may enhance their feeling of confidence and competence. These images need to be

qualities and skills that are specific to the sport situation. In Week 4, attentional centering strategies are presented. Three critical times that athletes need to be aware of are just before (a) a competition starts, (b) the initiation of a new event, and (c) making critical decisions during competitions. Following the centering of attention, athletes learn how to change negative attitudes. This process involves choosing a particular attitude that occurs frequently and results in the impairment of performance. Nideffer indicated that athletes should focus on redirecting attention from the attitude back to the task. Positive self-images are especially useful as a motivational tool during this phase. In the final stage of the program, Nideffer urged athletes to utilize mental rehearsal procedures to improve the consistency of performance. Mental rehearsal strategies appear to be most helpful in improving specific performance segments (e.g., free throw, tennis serve, and field goal kicking).

In his book, Singer (1986) discussed the relationship between optimal functioning and peak performance. Regardless of skill level (i.e., beginner or elite), athletes can learn to maximize their resources to perform their best. According to Singer, "when everything functions optimally, we witness peak

performance" (p. 2). Although each sport is unique with respect to the demands placed on athletes, concentration, relaxation, and motivation are concerns that are associated with just about every level of competition. Singer's MT program is designed to deal with these issues. This model focuses on developing the intentional, emotional, and attentional state of the athlete. With respect to the intentional states, Singer presented an in-depth description of motivation and its function. In addition, he discussed the relative importance of persistence as a component of motivation. He also provided an explanation of and instruction on how to effectively set goals.

Singer (1986) also employed the use of the Achievement Management Plan (AMP) involving strategies that will help the athlete achieve goals and evaluate performance. AMP also functions to enable the athlete to develop more effective time management skills. In regulating the emotional states of athletes, Singer concentrated on enabling athletes to recognize and control their own levels of arousal. He stated that the influence of arousal does not necessarily have to be detrimental to performance. One of his arguments was that "perceived stress is associated with the meaningfulness of the pending activity" (p. 50).

Athletes may lie anywhere on an arousal continuum

at any given point in a competition. This continuum ranges from under aroused to optimally aroused to over aroused. Singer presented key somatic and psychological complaints that will help athletes to recognize their own levels of arousal. In addition, he discussed several MT strategies from which athletes may choose. These are simulation training, recall of optimal states, progressive relaxation, autogenic training, deep breathing, detachment, self-hypnosis, focus of attention, listening to music, systematic desensitization, and biofeedback. Athletes are encouraged to explore these strategies and to determine which ones are most effective for them. Finally, the strategies presented to enhance attentional control serve five functions. They help athletes to (a) ready themselves for competition, (b) attend to the right things at the right times, (c) produce correct movements, (d) effectively and efficiently monitor performance, and (e) learn from performance outcomes.

Singer's (1986) program differs from others with respect to the use of a detailed time line for the development of psychological skills and specific emotional control strategies. Whereas both Curtis (1988) and Nideffer (1985) present a specific, systematically designed timetable for the development of psychological skills for sport, Singer does not. In

addition, Singer offered a variety of arousal control strategies from which the athlete could choose. Several other MT programs offer only one strategy to the athlete (e.g., Bennett & Pravitz, 1982; Gauron, 1984; Porter & Foster, 1986). In closing, Singer's model for performance enhancement is characterized by strategies that facilitate the control of intentional, emotional, and attentional states.

An in depth coverage of Curtis' (1988) MT program will be presented. Curtis designed the program so that athletes could develop the skills necessary to enhance mental conditioning. The components are essentially the same as previously reported in other packaged MT programs (e.g., Bennett & Pravitz, 1982; Harris & Harris, 1984). Elements include relaxation, positive affirmation statements, mental recall, and mental rehearsal. Curtis also urged athletes to incorporate goal setting into their overall mental conditioning program. According to Curtis (1988, p. 8), goals help athletes to "activate the success mechanism in the body."

Step 1 of the mental conditioning program is relaxation training. The primary function of relaxation is to teach athletes how to control their own arousal levels. Additionally, relaxation provides athletes with these associated benefits:

(a) preparation for mental imagery, (b) improved concentration, (c) improved quality of sleep, (c) improved body awareness, (d) reduced recovery time, (e) decreased minor illnesses and symptoms of illness, and (f) increased sociability. In many cases, self-imposed mental limitations prevent athletes from reaching their maximum performance potential. Athletes who are attempting to improve performance may desire to change their self-images and reduce the influence of these mental limitations. Relaxation enables individuals to control their rational minds and present images of the new self to the subconscious mind. Curtis (1988) suggested that the subconscious mind will more readily accept these new images than the conscious mind.

He presented two relaxation techniques, sequential relaxation and an exhalation exercise. In the sequential relaxation script, athletes are instructed to focus their attention on various parts of their bodies (e.g., feet, lower legs, upper legs, torso, arms, hands, shoulders, and head) until total relaxation is achieved. Athletes are instructed to practice the exhalation exercise three times per day with each session lasting 3 to 5 min. This procedure is maintained for the first 3 days of the MT program. Next, individuals are instructed to practice the sequential relaxation exercise once a day for 7 to 8

min, continuing for 3 days.

The second step of the program, positive affirmation statements, is introduced during the 2nd week. During Days 8 to 10, athletes relax once a day using their preferred method (i.e., exhalation or sequential relaxation) and then repeat affirmation statements 5 to 20 times on each exhalation. Days 11 to 14 involve the same procedure except athletes must have three sessions a day rather than one. Curtis (1988) also urged athletes to use affirmation statements during alert states.

In the third step of the program, athletes visualize mental recall experiences along with relaxation and positive affirmations. Effective mental recall is an important component of Curtis' (1988) MT program. It reinforces the positive nature of the program by encouraging athletes to relive previously successful experiences. This process helps to build the self-confidence of athletes. Athletes begin to incorporate mental recall experiences during the 3rd week of the program (i.e., Days 15-21).

The final step of the Curtis (1988) program is mental rehearsal. Mental rehearsal involves visualization of future events, situations, and performances. Mental rehearsal serves three basic purposes. First, it helps athletes to enhance their

own self-images. Secondly, it enables athletes to practice future events so that they can anticipate and effectively cope with any problems. Finally, mental rehearsal provides athletes with a substitute for physical practice (i.e., neuromuscular practice). Curtis suggested that the mental rehearsal experiences should be visualized using as much detail as possible. It is also helpful, Curtis indicated, to utilize a first person perspective and to visualize performing as perfectly as possible. Mental rehearsal can be incorporated sometime during the 4th week of training (e.g., Days 22 to 24) and should be performed once a day.

The review of primary MT packaged programs shows the overall importance of certain components. When comparing specific aspects of each package, it is easy to determine which components are most significant. The consensus of mental trainers is that relaxation training, attentional control, mental imagery, and positive self-statements should be an integral part of any MT program (Bennett & Pravitz, 1982; Curtis, 1988; Gauron, 1984; Harris & Harris, 1984; Martens, 1987; Nideffer, 1985; Orlick, 1980; Porter & Foster, 1986; Singer, 1986; Suinn, 1986; Unestahl, 1983). These specific MT strategies and others utilized in this investigation will now be discussed in greater detail.

Research literature regarding the effectiveness and application of each strategy will also be presented.

Goal Setting

Goal setting, a technique used to increase motivation (Giannini, Weinberg, & Jackson, 1988), appears as an integrated strategy in 8 of the 11 packaged MT programs reviewed (Bennett & Pravitz, 1982; Curtis, 1988; Harris & Harris, 1984; Martens, 1987; Orlick, 1980; Porter & Foster, 1986; Singer, 1986; Unestahl, 1983). One main function of goals is to help the athlete direct behavior (Porter & Foster, 1986). Curtis (1988), in his MT program, provides athletes with the following guidelines for effective goal setting. Goals should (a) be highly specific, (b) be written, (c) have a means of objective measurement, (d) have a specific time factor incorporated, and (e) be challenging, yet attainable. He also suggested that goals function to initiate a success cycle within the athlete. Essentially, establishing a goal enables athletes to have direction. By continually focusing on one specific area, athletes may evaluate their progress toward a particular goal and become more motivated to achieve it. This increase in motivation becomes translated into behavioral change. Thus, the athlete strives to achieve the goal.

Essentially, athletes may choose to set two types

of performance goals, long-term and/or short-term (Archer, 1987). Curtis (1988) argued that short-term goals enable athletes to attain long-term goals. Short-term goals are small steps that allow athletes to gradually progress toward long-term goals.

One study evaluated the effect of both short- and long-term goal setting on basketball performance. Archer used female varsity basketball players (N = 13) in his goal setting investigation. The researcher met with all players 1 week prior to the first game to explain the program. During this initial meeting, athletes recorded five long-term (i.e., season) goals on cards. After this session, subjects met weekly with the investigator to set and evaluate short-term (i.e., weekly) goals. Both individual and team goals were set. Dependent measures included players' postseason questionnaires, an interview with the head coach, and accumulated goal statistics. Both the coach and the players perceived the program to be successful. In addition, the use of weekly meetings was found to be the most effective technique, and the establishment of long-term goals was found to be the least effective technique. It appears as if the weekly discussion and evaluation of the goal setting process may have led to greater commitment to, or accountability for, specific goals. The consistent evaluation may have also

influenced the motivational levels of the athletes. Continued success and perceptions of improvement may have implications for the self-efficacy of athletes in competitive situations. The relationship between the development of self-efficacy and goal setting will now be discussed in greater detail.

In addition to activating a success cycle, goal setting may also have an impact on subjective perceptions and feelings of self-efficacy. Miller and McAuley (1987) predicted that goal setting would result in improving both subjective and objective measures of free throw performance and facilitate a more positive perception of self-efficacy. Subjects (N = 18) were enrolled in an undergraduate beginning basketball class. Researchers, using pretest free throw measures, matched subjects by ability and randomly assigned them to the goal trained or non-goal trained groups. Each subject attempted 20 free throws every week for 5 weeks. These recorded values provided the objective measures of performance. The subjective measures consisted of a 7-point Likert scale assessing perceived degree of success and a 4-item self-efficacy inventory. Weekly, the instructor held a 10-min conference with each group. The non-trained group received a review of free throw shooting technique. Goal trained subjects were reminded of the goal setting process.

Instructions involved the following dimensions: (a) using weekly subgoals and long-term goals, (b) setting challenging, yet attainable goals, (c) committing to goals, (d) identifying outcome versus performance based goals, (e) using multiple goals, and (f) employing goal specificity and flexibility.

Although the free throw accuracy of the goal trained subjects did not improve significantly during the course of the investigation, they reported higher perceptions of success and self-efficacy than the non-goal trained subjects. The positive relationship between goal setting and the development of self-efficacy has been demonstrated by other researchers as well (e.g., Miller, 1986). These results indicate that basketball performance may need to be evaluated according to objective and subjective criteria. Performance increments of the goal trained subjects were not continuous but did show consistency throughout the trials. This result lends support to other findings that suggest that MT programs may improve the consistency of performance (Mahoney et al., 1983).

Other research supports the importance of goal specificity with respect to effective goal setting (Burton, 1989). Burton hypothesized that specific goal setting would have more impact on performance outcomes than general goal setting and that task complexity

would mediate the relationship between goal setting and performance. The subjects (N = 23) were male and female undergraduates enrolled in a physical education majors' basketball course. After a pretest to assess skill level, subjects were matched by ability and randomly assigned to specific or general goal setting groups. Task complexity for the basketball skills was categorized as follows: high complexity (field goal shooting and free throw shooting), low complexity (defensive footwork and quickness/agility drills), and moderate complexity (dribbling, ball handling, and passing). During 15 sessions of the course, students spent the first 20 min of the sessions working with a partner on a seven-station skill circuit. The specific-goal subjects were given cards specifying moderately difficult performance goals for each skill. General-goal subjects were simply reminded to do their best. Performances were recorded on each card.

According to the results, the specific-goal subjects performed significantly better than general-goal subjects on two basketball skills, defensive footwork, and ball handling. In addition, task complexity was found to mediate the relationship between goal setting and basketball skill development. This study lends further credibility to the significance of specificity with respect to the goal

setting process. In conclusion, goals must be highly specific in order to be effective. Giannini et al. (1988) contended that goals must also be accepted by athletes in order to be achieved.

Relaxation Training

The major benefits of relaxation for athletes have been presented previously in the description of Curtis' (1988) MT program. A brief review, however, is in order. Relaxation training functions primarily to prepare athletes for mental imagery. Additionally, it facilitates the development of self-regulation skills. According to Singer (1982), relaxation training enables athletes to recognize their own optimal levels of arousal. Through this self-regulation of arousal states, athletes may have more control over their performances. Singer equated the development of relaxation training skills with that of physical skills. In order to become proficient at the task (i.e., relaxation), athletes must systematically and regularly practice the skills involved.

In the research literature, the performance enhancing capabilities of relaxation training have shown mixed results. In most of the available studies, relaxation training has been applied in conjunction with other MT techniques such as imagery (e.g., Hall & Erffmeyer, 1983; Kolonay, 1977). Nideffer and Deckner

(1970), an exception to this generalization, investigated the relationship between high levels of precompetitive tension and athletic performance, regardless of task complexity. A male intercollegiate shot putter who had plateaued in his performances was utilized in the case study. The athlete received instruction in progressive relaxation. Two weeks after introduction to the relaxation training, the subject had a conference record setting performance. He continued to improve in subsequent performances as well.

Similar results were not evident in a study by Kolonay (1977). Kolonay investigated the influence of visuo-motor behavior rehearsal (VMBR) on basketball free throw shooting performance. The subjects (N = 72) were male basketball players from eight college basketball teams. Each team was randomly assigned to one of four groups. The treatment groups, each consisting of two teams, were categorized as follows: Group A, VMBR training plus relaxation and imagery exercises; Group B, relaxation exercises only; Group C, imagery exercise only; and Group D, control. During the 6-week treatment phase, coaches of the three treatment groups played audiocassettes containing the respective exercises before 15 basketball practices. Each of these sessions lasted approximately 10 min.

Group A significantly improved their percentage of successful foul shots from pretreatment to posttreatment. The performance improvements of Groups B and C were not statistically significant. Control group performances were unchanged. The findings of this study demonstrate that the use of relaxation training is not an effective MT strategy when used alone. However, evidence does suggest that it can significantly enhance athletic performance when used in conjunction with other strategies (Kolonay, 1977).

Imagery

Recent sport psychology interests have shifted from the investigation of motivation and personality to psychological training that focuses on behavior change (Suinn, 1983). Imagery is just one strategy used to achieve this goal. According to Hughes (1990), sport imagery commences when athletes first become involved in a particular sport. Research supports his contention by indicating that the use of imagery by athletes occurs across all competitive levels (i.e., novice, intermediate, and elite) (Hall et al., 1990). However, imagery use by athletes does not appear to occur as a part of a structured MT program. Thus, many are utilizing imagery without any formal instructions. In this section, the application of imagery training in the basketball field setting will be presented.

Generalizations regarding the use and development of imagery will also be summarized.

Imagery may be the most effective psychological strategy to use when transferring skill acquisition to competitive situations (Suinn, 1983). Essentially, imagery is mental practice. Mental practice, as defined by Richardson (1967), is the "symbolic rehearsal of a physical activity in the absence of any gross muscular movements" (p. 95). It appears as if mental imagery may have both cognitive and motivational roles in behavior (Feltz & Landers, 1983; Howe, 1990). On the cognitive level, mental practice appears during both initial and later stages of learning (Feltz & Landers, 1983). These authors propose that mentally imagining specific skills enables athletes to rehearse the cognitive, or symbolic, elements of the skills. This process appears to facilitate the initial and continued acquisition of motor skills. In the motivational role, mental imagery techniques function to psychologically prepare athletes to perform specific motor skills. This state of psychological readiness has potential effects on the confidence and motivational levels of the athlete (Murphy, 1977). Therefore, the influence of the mental imagery may have an indirect impact on performance outcomes.

The following classifications of mental imagery

appear in the literature: recreative, creative, and cue dependent (Howe, 1990). Recreative imagery refers to the reproduction of a previously accomplished action. Recreative imagery occurs when athletes image (i.e., visualize) themselves experiencing optimal performance. The second classification, creative imagery, involves the production of an image that has not previously occurred. Athletes who are training for a specific competition may visualize themselves performing in that particular setting. Finally, the generation of images not directly related to the specific skill is termed cue dependent or emotive imagery. For example, basketball athletes may produce images of themselves as being strong, but these perceptions may not be directly related to foul shooting.

Several researchers have investigated the impact of imagery training on basketball performance outcomes (e.g., Hall & Erffmeyer, 1983; Murphy, 1977; Smith, 1987b; Wrisberg & Anshel, 1989). Smith designed an imagery training program composed of the best procedures available in the literature and then evaluated its effectiveness in an applied setting. The treatment subjects (N = 12) were members of a collegiate men's basketball team competing in the Big Ten athletic conference. Control subjects (N = 21)

consisted of basketball team members from two other conference schools. All athletes were considered to be elite performers because of the competitive rankings and history of the conference. Pre- and posttreatment measures of psychological and physical skills provided the researcher with performance data. Psychological assessment involved self-report measures of trait and state anxiety and self-confidence. Physical skill assessment consisted of in depth coaches' evaluations and game statistics.

Progressive relaxation was incorporated at the beginning of the program to facilitate the development of relaxed states. Initial imagery sessions occurred during the first 2 weeks of the program and lasted approximately 30-60 min. For the next 14 weeks, athletes participated in three sessions per week. The remainder of the season, 4 weeks, subjects were involved for one session per week. Each of the guided imagery sessions lasted 5-10 min at the end of practices. One topic was presented during each session (e.g., free throw shooting, defense, etc.). The topics were decided upon by the coaches immediately prior to each session. Approximately equal time was devoted to physical (19 sessions) and psychological (24 sessions) skills. The findings fall into four categories: anxiety, self-confidence, execution of strategies, and

basketball performance.

Imagery training did not decrease competitive state anxiety. The data indicate some positive improvements in the development of self-confidence over time. However, the results were not statistically significant. In terms of execution of specific strategies, the findings support other researchers who suggest that imagery can enhance cognitive oriented tasks (Feltz & Landers, 1983). Finally, although the athletes perceived the program to aid their performance, this effect was not supported by the statistical analysis. These findings, although they lack statistical significance, appear to have practical significance with elite athletes.

In another study, Murphy (1977) investigated the relationship between using mental imagery as a warm-up activity and ensuing performance outcomes. The subjects (N = 18) were members of junior varsity and varsity high school basketball teams. The pretreatment assessment lasted 4 days. During this time, subjects were asked to shoot 20 jump shots per day. The shooting spot was located 4.57 m from the basket at a 45° angle. The subjects were then randomly assigned to experimental and control groups. Mental practice for the experimental group required 4 days per week. These warm-up sessions involved visual instruction (i.e.,

diagrams on an overhead), verbal instruction (i.e., tape recording of researcher guiding subjects through jump shot), and imaging (i.e., no presentation of verbal or visual cues). Control group subjects were involved in physical practice of jump shots during these sessions. A posttest consisting of 20 jump shots was administered after the 25-day treatment period.

Murphy (1977) found that mental practice as a warm-up was not significantly better in improving jump shooting accuracy than physical warm-up. However, the changes in shooting accuracy were slightly greater for the mental practice group. This finding indicates that athletes may benefit just as much from mental warm-up as they do from physical warm-up. Based on this one study, however, it would be absurd to advocate the replacement of physical with mental practice. Nevertheless, imagery may be an effective technique for athletes to utilize when physical practice is impossible or impractical. Various illustrations of this practice already exist in sport. For example: (a) the basketball players who image themselves shooting foul shots while at the line (Hall & Erffmeyer, 1983), (b) the karate performers who image themselves breaking boards (Seabourne et al., 1985), or (c) the figure skaters who image themselves performing their routines (Mumford & Hall, 1985). It appears as

though the mental practice of physical skills does have a positive impact on performance outcomes, yet its influence has not been consistent.

Wrisberg and Anshel (1989) investigated the influence of MT strategies on the free throw shooting performance of youths. Male youths (N = 40), attending a coed sports camp, were randomly selected from a list of 10-12 year old campers who were considered by their counselors to have good or excellent basketball shooting skill. Baseline measurement consisted of 20 foul shots attempted with a 45-s interval between each shot. During the interval, subjects read a section of a book in order to prevent mental rehearsal of the task. After the baseline trials, the treatment groups each received 15 min of their respective conditions. The groups were assigned as follows: (a) mental imagery, (b) arousal adjustment (i.e., relaxation), (c) mental imagery and arousal adjustment, and (d) control. Imagery instruction involved visualization of foul shots using an internal perspective. Posttreatment measurement occurred on the following day.

The combination of imagery and arousal adjustment was found to be more effective in enhancing performance than either technique used independently. This finding is in contrast to Murphy's (1977) results, which demonstrated that imagery alone was an effective

technique. In terms of performance outcomes, the use of imagery techniques as the only MT strategy did not significantly improve performance outcomes. This findings is in agreement with Smith's (1987b) results. Smith (1987a) also suggested that the use of relaxation prior to imagery may facilitate the development of sport imagery training. Research in mental imagery is equivocal with respect to its effectiveness as a single MT strategy. Nevertheless, the evidence supports the contention that MT techniques, such as imagery, are most effective when used in conjunction with other strategies (Wrisberg & Anshel, 1989).

Concentration Training

Coaches, athletes, and sport psychologists recognize the relationship between attentional focus and optimal athletic performance (Crossman, 1984; Silva, 1979). These individuals claim that there are a variety of distractions, both internal and external, that can have adverse effects on performance. Despite the logical relationship between concentration and athletic performance, little research is available regarding the development and maintenance of concentration in sport. According to Silva (1979), the available evidence indicates that "mental clarity, proper regulation of attention, and concentration all tend to enhance skill performance" (p. 221).

The few studies investigating the relationship between concentration and athletic performance have demonstrated unequivocal results. Silva (1979) examined the influence of behavioral and situational factors on concentration and skill performance. Behaviors selected by the investigator were hostile-aggressive (i.e., expenditure of energy with intent to harm) and proactive-assertive (i.e., expenditure of energy for goal-directed behavior). The two competitive situations were (a) a 3-on-3 full court basketball game, and (b) a peg board assembly task requiring subjects to compete against a confederate. Male volunteers (N = 22) were randomly assigned to one of four treatment conditions: (a) proactive-assertion nonsport, (b) proactive-assertion sport, (c) hostile-aggressive nonsport, and (d) hostile-aggressive sport. Subjects were tested individually in their respective conditions. After the test sessions, subjects and confederates completed the Nowlis Mood Adjective Check List (MACL). With respect to the sport setting, percentage of shots made during game play was utilized as the performance measure.

The results indicated that the proactive-assertion subjects shot significantly better than the hostile-aggression subjects. In addition, the proactive-assertion subjects displayed significantly higher

concentration scores than those in the hostile-aggressive group. Because of the main effects for behaviors and situations, Silva (1979) concluded that concentration level and skill performance are dependent upon both psychological and social environmental factors. The superior performance of proactive-assertive subjects in both settings indicates that higher concentration levels were valuable to these individuals. This study provides evidence supporting the existence of a positive relationship between concentration and basketball performance.

Most athletes have the ability to focus on a task for a short period of time. However, sustained concentration for an extended period of time can be more difficult. It has been stated previously that few studies have investigated the relationship between the development of concentration skills and ensuing athletic performance. One such exception involved female collegiate basketball players (N = 10) from a Canadian university (Crossman, 1984). Players were rank ordered by ability and matched into experimental and control groups. Pre- and posttest perfomance measures of the following statistics were compiled: field goal percentage, free throw percentage, point per game average, offensive rebounds, defensive rebounds, and turnovers.

Experimental subjects were instructed to focus their attention from the general (i.e., unrelated to basketball) to the specific (i.e., directly related to dealing with basketball and an ensuing competition). The subjects were introduced to the program by the researcher during four separate sessions. The attention clearing and focusing techniques were to be employed pre-game, after warm-ups, and whenever the subjects were on the bench and their thoughts were not totally on the game. A standardized log was used to record practice sessions, thoughts and feelings before using the concentration techniques, and subjective evaluations regarding effectiveness of techniques. Control subjects had no other involvement.

In five of the six performance measures, the experimental group performed better than the control group. However, these differences were not statistically significant. This finding may best be explained by the small sample size. Even though statistical significance was not achieved, all but one of the athletes perceived the techniques to be helpful. The techniques helped them calm down, regain composure, and redirect their attention at critical times. Crossman (1984) contended that many coaches and athletes view these increments to be of practical significance, regardless of statistical significance.

In summary, several different factors can distract athletes from attending to the performance of skills directly related to their sport. Irrespective of the source, these distractions may adversely effect performance outcomes. Various MT programs incorporate concentration training as an integral component (Gauron, 1984; Harris & Harris, 1984; Martens, 1987; Nideffer, 1985; Singer, 1986; Suinn, 1986; Unestahl, 1983). Regrettably, researchers have conducted limited empirical studies that have investigated this area. However, the available evidence does imply that a positive relationship exists between attentional focus and basketball performance.

Combination Interventions

The research literature presented thus far has dealt with the effectiveness of specific MT techniques as athletic performance enhancing strategies. MT components reviewed were goal setting, relaxation training, imagery, and concentration training. In the majority of the studies, the strategies were applied individually (e.g, Burton, 1989; Crossman, 1984; Nideffer & Deckner, 1970; Smith, 1987b). Several researchers, however, have investigated the effectiveness of combined MT procedures (e.g., Hall & Erffmeyer, 1983; Kendall, Hrycaiko, Martin, & Kendall, 1990; Meyers & Schleser, 1980; Suedfeld & Bruno, 1990).

Some researchers have suggested that individual MT components may be most effective when used in conjunction with other strategies (Kolonay, 1977; Wrisberg & Anshel, 1989). In this section, combined MT programs will be reviewed. These packages will be evaluated and discussed in terms of their influence as basketball performance enhancers.

Meyers et al. (1982) investigated the influence of a cognitive behavior intervention on the competitive performance of college basketball players. The subjects (N = 2) were female members of an Association of Intercollegiate Athletics for Women (AIAW) varsity basketball team. Both subjects experienced concentration problems. One subject, a center, experienced anxiety associated with free throw shooting. The forward suffered anxiety from her field goal shooting performance. After a seven-game baseline, the center was counseled by a sport psychologist 23 times through a 6-week period. Following the 20th game, she was instructed to discontinue cognitive, relaxation, and imagery exercises. The forward attended 15 sessions after a 19-game baseline. These sessions lasted for 5 weeks, the remainder of the season. For both subjects, the sessions consisted of relaxation training and visualization. An additional component was the

presentation of hierarchical scenes, proceeding from successful performances to problematic situations. The subjects were also instructed in coping skills and self-instruction. Imagery exercises incorporated visual, auditory, and kinesthetic components. An internal imagery orientation was also used.

Game statistics provided researchers with the objective measures of performance. The baseline free throw shooting percentage for the center was established as 41%. During the intervention, her percentage increased to 54.8% and then decreased to 28.6% during the return to baseline. Throughout the length of the study, her field goal shooting percentage remained relatively unchanged. For the forward, free throw shooting percentage remained stable (67.9% at baseline and 68.0% during intervention). Field goal shooting, however, changed from 36.7% to 52.2% during the intervention. The investigators concluded that the cognitive behavior strategies utilized may have had a positive impact on performance. They express caution when interpreting the results of the study because of the small sample size and the lack of statistical testing. These factors limit the generalizability of the findings.

In another study, Meyers and Schleser (1980) utilized a cognitive behavioral intervention with a

Division I male basketball player. During the first 1.5 sessions, the researchers used an assessment to help solve the athlete's concentration and confidence problems. The remainder of the seven sessions involved relaxation training, cognitive intervention, coping strategies, self-instruction, and imagery exercises. The researchers instructed the athlete to practice relaxation and imagery exercises each day before practice and before pre-game warm-ups. The researchers hypothesized that a cognitive intervention that included a coping approach to the demands of the task may enhance performance. The following game statistics were used for statistical analysis: minutes played, field goals attempted, field goals made, foul shots attempted, free throws made, and total points scored. The statistical analyses yielded that total points per game, field goal percentage, and field goals made per game increased significantly. However, the number of field goal attempts per game did not increase significantly. This finding indicates that the increase in total points was due to an increase in accuracy, rather than in shots attempted. The investigators concluded that cognitive coping strategies could be learned and that these strategies may be a component of improved performance. A positive relationship between the development of coping

strategies and enhanced basketball performance has been demonstrated by other researchers as well (Hamilton & Fremouw, 1985). Meyers and Schleser (1980) noted that athletic performance is multidimensional in nature and the results obtained are dependent upon a variety of factors, such as improvement over the season, strength of opponents, and emotional or motivational factors. Nevertheless, a multidimensional MT program has shown merits as a potential enhancer of performance.

Available research has not consistently shown that mental practice will enhance the performance of motor tasks (Kendall et al., 1990). Studies presented thus far, however, have demonstrated the effectiveness of MT interventions that combine a variety of psychological skills.

Researchers investigated the effectiveness of a combined MT package on the basketball performance of elite athletes (Kendall et al., 1990). The subjects ($\underline{N}$ = 4) were female intercollegiate basketball players who were starters or played often. These individuals had no prior MT experiences. The dependent variable was a specific, measurable behavior, cutting off the baseline (i.e., defending an opponent's drive to the basket). Performance measures included the following: videotaped play, coaches' rating of defensive play (i.e., correct or incorrect), personal log, visual

imagery questionnaire, Gordon's Test of Visual Imagery Control, and a social validation questionnaire.

After a stable pretreatment assessment was performed, subjects were sequentially introduced to the MT intervention when they were not playing. On Day 1 of the introduction, subjects received instruction in relaxation training. Day 2 consisted of imagery techniques and exercises. During Day 3, self-talk focusing procedures were presented to the athletes. On Day 4, researchers used audio tapes with visualizations to lead the athletes through the specific defensive skill. Finally, Day 5 incorporated the use of all of the MT procedures plus the use of the audio tape. These introductory sessions lasted approximately 15-45 min. For the remainder of the season, maintenance exercises involved 15 min per day. The subjects were also asked to practice their MT exercises twice on game days.

The investigators concluded that the combined MT intervention, consisting of imagery, relaxation, and self-training, was effective in enhancing the performance of a specific defensive skill. This finding lends further support to the efficacy of developing combined versus single psychological skills for enhancing basketball performance.

Other investigators studied the effect of VMBR

with videotaped modeling on the free throw performance of an intercollegiate female basketball team (Hall & Erffmeyer, 1983). Subjects (N = 10) were randomly assigned to one of the following groups: VMBR plus videotaped modeling or progressive relaxation and visualization without modeling. Pretest and posttest measures involved compiling percentages of 20 daily foul shots over a 5-day period. Week 1 of the training consisted of relaxation and visual imagery exercises. Each session lasted approximately 30 min. During Week 2, all subjects practiced relaxation and imagery for 20 min each session. After the initial time, the videotaped modeling group practiced 20 min. During this time the other group continued relaxation and visualization exercises. The videotape consisted of a female basketball player executing 10 consecutive foul shots. The subjects were shown the video and then instructed to image themselves executing a perfect shot. This process was repeated several times over the 20-min period.

The results indicate that the VMBR group significantly improved free throw performance over the visual imagery group. The researchers concluded that VMBR and modeling enhanced the free throw performance of college athletes. Conceivably, these findings may have greater credibility than previous research

presented. Larger sample sizes may increase the generalizability of the results if subjects are representative of the population. Supporting evidence also suggests that MT techniques may be more effective with experienced performers.

The studies presented in this section have demonstrated a positive relationship between the use of combined MT programs and the improvement of basketball performance. Unfortunately, the majority of these investigations involved small sample sizes, which may limit the generalizability of the findings. Regardless of these limitations, statistically significant improvements in basketball performance were exhibited. Even minute increments in performance may be of practical significance to the coach and athlete. Some of the psychological skills utilized in these investigations include relaxation training, coping exercises, self-talk strategies, imagery, and other cognitive interventions. In conclusion, the research suggests that psychological skill development may be most effective when a variety of skills are used to enhance the performance of athletes in competitive situations.

Summary

The purpose of this chapter was twofold: to review the primary MT books available and to present

the literature investigating the effectiveness of various psychological skills as enhancers of athletic performance. MT has been defined by several mental trainers as the process of systematically developing psychological skills in order to enhance athletic performance. Most mental trainers agree that many elements influence performance. MT researchers have concluded that levels of psychological functioning may separate two athletes of equal physical abilities. All pre-packaged MT programs reviewed here contained essentially the same components. Elements of the programs included the following: relaxation training, concentration training, cognitive restructuring, visualization, and positive self-statements.

In discussing the development of psychological skills for performance enhancement, the authors of the MT programs emphasized the impact of the mind-body interaction as a determinant of performance outcomes. Many of the techniques presented by the mental trainers focus on facilitating the flow experience. Such strategies encourage athletes to become "at one" with the sporting experience.

The various mental trainers utilized several different formats when they presented their programs to the reader. Some of the programs involved a highly systematic step-by-step approach to the development of

psychological skills (e.g., Curtis, 1988). These MT programs also included a specific timetable for the development of the mental strategies. Other authors (e.g., Singer, 1986) presented a variety of MT techniques so that athletes may select what skills are appropriate for them.

A total of 11 MT books were reviewed in this chapter. Each of these programs contained essentially the same elements. The differences between programs were primarily linked to the number of strategies from which to choose, the existence of a timetable, and the incorporation of log keeping. Two important factors to consider when choosing a MT program are the amount of structure desired and amount of time available (i.e., both length of sessions and length of program).

In the second part of this chapter, literature was presented regarding the various components of the MT programs. The topics reviewed included goal setting strategies, relaxation training, imagery training, concentration training, and combination interventions. Each topic was discussed with respect to its effectiveness as an enhancer of basketball performance.

It appears as if goal setting provides two functions. The process serves to activate the success mechanism in athletes by providing them with a sense of direction. Another function of goal setting is related

to the development of self-efficacy. Research has demonstrated a relationship between goal attainment and improved subjective perceptions of self-efficacy (Miller & McAuley, 1987). Additional evidence suggests that short-term goal setting may be more effective as a performance enhancing technique than the use of long-term goals (Archer, 1987). Goal specificity, task complexity, and goal acceptance were also shown to influence the effectiveness of goal setting programs.

The purpose of relaxation training as a component of a MT program rests in the development of self-regulation abilities. Through the process of acquiring relaxation skills, athletes may learn to recognize and control their own optimal levels of arousal. This self-regulatory function may enable athletes to improve the consistency of their performance. Relaxation training, when used alone, was not found to have a significant impact on performance. However, the available data imply that relaxation can have a significant impact on athletic performance when used as an adjunct technique.

Researchers suggest that imagery use by athletes occurs across all competitive levels (Hall et al., 1990). Although the mechanisms explaining imagery are not fully understood, imagery appears to perform both a cognitive and motivational function. In terms of the

cognitive function, mental imagery seems to enable athletes to rehearse the cognitive, or symbolic, elements of skills. With respect to motivation, imagery may affect states of psychological preparedness of athletes. Each of these functions may have an impact on performance outcomes.

The available research investigating the relationship between imagery training and basketball performance is equivocal. In one study, in which imagery was the only psychological technique used, the researcher reported evidence supporting the use of imagery training as a performance enhancing technique (Murphy, 1977). However, the majority of the evidence supports the contention that imagery training, similar to the development of other psychological skills, may be most effective when used in conjunction with other psychological strategies.

The impact of concentration on performance is apparently evident by its inclusion in several MT programs. Several authors of MT books recognized the potential detrimental effects of distraction on ensuing performance. Although few researchers have investigated the influence of attentional focus on basketball performance, the bulk of the evidence suggests that a positive relationship exists.

In summary, the evidence presented suggests that

using a combination of psychological skills may be a more effective strategy than utilizing single techniques. Mental trainers now recognize that a variety of factors may influence basketball performance outcomes. It appears to be most beneficial to choose a variety of MT strategies when attempting to enhance the performance of athletes in competitive situations.

Chapter 3

METHODS AND PROCEDURES

In this chapter the procedures utilized in conducting this investigation are discussed. Specific topics are as follows: (a) selection of subjects, (b) procedures, (c) testing instruments, (d) MT program, (e) individual interventions, (f) scoring of data (g) treatment of data, and (h) summary.

Selection of Subjects

The subjects (N = 12) were members of a Division III women's basketball team. Their ages ranged from 18-22 years. All players had previously competed in 4 years of interscholastic basketball competition. The subjects were treated in accordance with the ethical principles of psychologists (American Psychological Association, 1973).

Procedures

Early in preseason the experimenter introduced the project to the head coach and to team members. After securing the commitment of both parties, baseline measures were taken for each individual using the PSIS (Mahoney et al., 1987) and the POMS (McNair et al., 1971). All subjects were tested in a controlled, quiet environment. The researcher tested subjects as a group rather than individually. The random order of

presentation of the questionnaires was decided by a toss of a coin. During the baseline measurement, subjects gave their informed consent (Appendix A) and completed a 2-item questionnaire regarding their beliefs about MT (Appendix B).

The head coach rank-ordered players by skill level and matched players by position. It was assumed that players matched by ability and position would have equal opportunity to acquire playing time. The results of the 2-item MT beliefs questionnaire were then compared to each matching. The player who responded with the more favorable view of MT was then assigned to the experimental group. It was postulated that a more favorable orientation would result in a greater likelihood that the subject would comply with the MT program. The players with the less favorable view were placed in the control group.

The PSIS and the POMS also were completed at critical points throughout the season to assess the on-going effects of the experimental treatment (i.e., the MT program). The critical points were as follows:

Assessment 1: pre-season (baseline).

Assessment 2: before first practice with coaches.

Assessment 3: before first game.

Assessment 4: after last game before winter break.

Assessment 5: before first conference game.

Assessment 6: before second round of conference play.

Assessment 7: after final game of the season.

Assessment 8: one week after Assessment 7.

During the course of the season, three players stopped participating on the basketball team for medical and/or personal reasons. Two of the players were from the control group and one was an experimental subject. Statistical analyses of the data were performed only for the subjects (n = 5 experimental group; n = 4 contol group) who completed the entire season.

Testing Instruments

Two separate instruments were used to assess the effects of MT on the experimental subjects. The PSIS (Mahoney et al., 1987) is a 45-item questionnaire that assesses the following psychological skills: anxiety, concentration, confidence, mental preparation, motivation, and team emphasis. The response modes consist of a 5-item agree/disagree format. The range of obtainable scores on each of the subscales of the PSIS was as follows: anxiety (0-40), concentration (0-24), confidence (0-36), mental preparation (0-24), motivation (0-28), and team emphasis (0-28).

A panel of experts examined the individual items

comprising each subscale of the PSIS. Mahoney et al. (1987) reported that there was support for the face or content validity of the questionnaire.

The second instrument, the POMS, was used to assess fluctuations in mood and affective states. The six subscales measured by this 65-item inventory were as follows: tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment. Each subject was asked to rate each item according to the degree to which she experienced the feeling. The rating scale ranged as follows: 0 = not at all, 1 = a little, 2 = moderately, 3 = quite a bit, and 4 = extremely. The range of obtainable scores on each of the subscales of the POMS was as follows: tension (0-36), depression (0-60), anger (0-48), vigor (0-32), fatigue (0-28), and confusion (0-28).

Evidence for internal consistency and test-retest reliability of the POMS has been demonstrated in studies of psychiatric outpatient samples. Internal consistency, using the Kuder-Richardson formula, was reported to be near .90 or above for all subscales of the POMS. McNair et al. (1971) also reported Pearson product-moment correlations ranging from .65 (for vigor) to .74 (for depression) over a 20-day period. The POMS appears to be a relatively stable measure of

mood states, given the fluctuating nature of mood.

Six factor analytic studies of the POMS provide evidence of the validity of the six mood scales. An examination of the individual items of each mood scale lends support for its face or content validity. There is also evidence for the predictive and construct validity of the POMS (McNair et al., 1971).

Evidence for the concurrent validity of the POMS also appears in the research. Pillard and Fisher (cited in McNair et al., 1971) reported that the POMS and the Taylor Manifest Anxiety Scale were administered to 22 patients waiting for their initial dental examinations. Tension scores were found to be significantly higher for dental patients than scores from 236 college students who took the POMS under relaxed conditions. Tension scores on both the POMS and the Taylor Manifest Anxiety Scale were very similar.

Two administrations of the PSIS and POMS were used to establish test-retest reliabilities with the present sample. Approximately 1 week following the last game of the season, all players involved in the study (N = 9) completed the inventories. Seven days later, all players again completed both inventories. During the interim between these two administrations, experimental group subjects were not involved in any formal MT

exercises. Intraclass correlations were calculated for all subscales of the PSIS and the POMS.

A 2-item questionnaire was also used to ascertain each subject's belief about the importance of mental preparation for sport performance and her willingness to commit to a MT program. Each player was asked to rate each item in terms of her degree of agreement (0 = strongly disagree, 10 = strongly agree).

MT Program

The pre-season MT program lasted approximately 4 weeks. During this time the experimental group met with the researcher for two 45-min sessions per week. Once the season began (i.e., after the first practice with the coaches) and throughout the competitive season, subjects attended one 30-min session per week. Control subjects had no other involvement except to take the PSIS and POMS at selected intervals throughout the season. These MT sessions involved extensive use of Curtis' (1988) MT program. Experimental subjects (n = 5) used relaxation training, mental recall and rehearsal, affirmation statements, concentration training and goal setting.

Curtis' (1988) program was designed to develop MT skills in 28 days. It was implemented to establish the fundamental skills needed for effective mental recall and rehearsal. His program consists of relaxation

training, positive affirmation statements, mental recall, and mental rehearsal. Each subject in the experimental group (n = 5) was asked to practice MT three times a day for 5 to 7 min each session. Each subject received an audiocassette tape that included the relaxation exercises. Individual logs were used to record the daily MT practice sessions.

Experimental subjects set long-term and short-term (weekly) goals. In addition, the coach developed weekly skill-related performance goals for the group. Each subject was held accountable for the group performance goals. During weekly MT sessions, each subject recorded on a poster whether she had achieved her goal. Each player was also videotaped performing the fundamental basketball skills (free throw, jump shot, lay-up) that were used during individual visualization sessions. Each subject also received a personal highlight tape with clips from her performances throughout the season. Cognitive restructuring involved eliminating the negative thoughts and replacing them with positive ones.

Another aspect of the weekly MT sessions was the use of Mahoney's (1984) concentration training exercises. Essentially, the procedure required approximately 5 min. Subjects were given a page of numbers. Numbers ranged from 00 to 100 randomly placed

on the page in boxes. Subjects were instructed to cross off the numbers consecutively from the smallest to the largest. Subjects were given 2 min to complete the task. After the time had elapsed, subjects totaled their scores. Next, subjects were asked to perform the same task, but they were presented with a distraction. During the allotted time, an audiocassette was played in the background with various verbal phrases, including a voice that attempted to distract the subjects by listing numbers. At the end of the 2 min, subjects totaled their scores and reported their results to the group. Concentration training exercises occurred during 13 of the MT sessions throughout the study.

Individual Interventions

Several weeks into the competitive season, the researcher incorporated the use of individualized interventions with each member of the experimental group. The first intervention period was initiated 6 weeks after basketball practices had begun. In Stage I of the intervention process, the researcher and a sport psychology consultant met with the head coach. During this meeting, the discussion centered on feedback from the psychological tests, practice performance, and game statistics of each athlete. This information was combined with the head coach's assessment of the player

and was used to draft an individualized intervention program for each experimental group athlete.

Stage II of the intervention involved a meeting with the athlete, coach, and sport psychology consultant. Each experimental player was shown her psychological skills and mood states profiles. Additionally, the head coach discussed each player's basketball performance. Next, each athlete was asked about her own perceptions of her performance. This information was incorporated into the previously outlined individualized program. The finalized intervention was then presented to the athlete to obtain her commitment to the program. Once commitment was obtained, the individual interventions were implemented.

At the end of a 4-week period, the athlete's performance and psychological skills were measured again. This process was used to examine the effectiveness of the individualized interventions and to evaluate the necessity of new interventions. Interventions were evaluated approximately every 4 weeks. Changes in interventions were based on basketball performance and PSIS and POMS scores.

Scoring of Data

The POMS was hand scored according to the procedures specified in the test manual (McNair et al.,

1971). This scoring method resulted in six subscale scores for each subject for each test administration. Overall means and standard deviations were calculated for both experimental and control group subjects.

All PSIS measures were hand scored and resulted in six subscales for each subject for each test administration. Overall means and standard deviations were calculated for both experimental and control group subjects.

Season game statistics were obtained from the Sports Information Department at the college. Game statistics were limited to the following categories: field goals attempted, field goals made, free throws attempted, free throws made, offensive rebounds, defensive rebounds, personal fouls, assists, turnovers, steals, and minutes played. Overall means and standard deviations were calculated for both experimental and control group subjects.

Treatment of Data

Overall group differences in basketball performance were investigated with game statistics. Means and standard deviations were calculated for both experimental and control group subjects for all 11 game statistics. Season total game statistics were subjected to a one-way ANOVA, which yielded F values for each of the 11 game statistics. The level of

significance was set at .05 for the rejection of the null hypothesis.

Means and standard deviations were calculated for experimental and control groups for each subscale of the PSIS and POMS. Repeated measures of PSIS and POMS data were analyzed using mixed model ANOVAs. These analyses provided group, trials, and Group x Trials interaction effects for all subscales of each inventory. The researcher established the .05 level of significance for the rejection of null hypotheses. Simple main effects were calculated for subscales that demonstrated significant Group x Trials interactions.

Summary

This chapter detailed the methods and procedures involved in this experiment. The subjects (N = 12) were members of a college women's basketball team. During pre-season, players were matched by ability and assigned to experimental and control groups according to their receptivenes to MT. Also during pre-season, all subjects completed the PSIS (Mahoney et al., 1987) and the POMS (McNair et al., 1971). The subjects also completed these psychological tests at critical points in the season. The experimental group (n = 5) was involved in a comprehensive MT program during pre-season and throughout the entire competitive season. The MT sessions involved extensive use of the Curtis'

(1988) packaged MT program. Specific components of the program were relaxation training, positive affirmation statements, mental recall and rehearsal, concentration training, and goal setting. In addition, individual interventions were designed to meet the specific psychological needs of each experimental group member. Basketball game statistics and repeated measures of the PSIS and POMS were used to determine the effects of the treatment conditions throughout the study.

Chapter 4

RESULTS

In this chapter the results of the study are presented. Results assessing the reliability of the testing instruments are presented. Descriptive and inferential statistics were used to test the hypotheses presented in chapter 1 regarding basketball performance, psychological skills, and mood data. In addition, the opinions of the experimental group members (n = 5) with respect to MT are reported.

Testing Instruments

The researcher established test-retest reliability of the PSIS and POMS with subjects in the present study. The final two administrations of both testing instruments were used to compute reliability coefficients. Intraclass correlations on the six subscales of the PSIS subscales were as follows: anxiety R = .93, concentration R = .90, confidence R = .99, mental preparation R = -.40, motivation R = .96, and team emphasis R = .80. Reliability coefficients of the six POMS subscales were as follows: tension R = .87, depression R = .97, anger R = .96, vigor R = .93, fatigue R = .76, and confusion R = .96.

Basketball Performance Data

Table 1 shows the descriptive statistics and F values for the basketball performance data of experimental (n = 5) and control group (n =4) subjects. As indicated by the means, the experimental group subjects displayed higher values on all of the following game statistics: field goals attempted, field goals made, free throws attempted, free throws made, offensive rebounds, defensive rebounds, personal fouls, assists, turnovers, steals, and minutes played. However, performance differences were not found to be statistically significant. The application of Curtis' MT program did not produce significant differences in basketball performance. Therefore, Hypothesis 1 was not supported.

Psychological Skills Data

The means and standard deviations for the PSIS data for experimental (n = 5) and control group (n = 4) subjects are reported in Table 2. As indicated by the means, the experimental group subjects revealed seemingly higher levels of anxiety and team emphasis.

In Tables 3-8, the results of the mixed model ANOVAs on the PSIS subscales are presented. As indicated in the tables, there were statistically significant Group x Trials interactions for the concentration (see Table 4) and confidence (see Table

Table 1

Means, Standard Deviations, and ANOVA of Game Statistics for Experimental and Control Groups

	Experimental		Control		
Statistic	M	SD	M	SD	F
Field goals attempted	213.20	122.90	137.00	64.80	1.24
Field goals made	83.60	44.93	44.50	18.48	2.61
Free throws attempted	60.40	33.24	34.75	21.06	1.78
Free throws made	138.60	23.05	18.25	12.12	2.51
Offensive rebounds	48.20	22.70	31.75	15.50	1.51
Defensive rebounds	70.60	39.69	46.25	24.78	1.13
Personal fouls	44.60	25.40	30.75	28.25	0.43
Assists	38.60	29.85	34.50	29.65	0.04
Turnovers	63.00	36.61	50.50	34.66	0.27
Steals	51.40	44.50	29.25	21.33	0.82
Minutes played	570.40	261.10	469.00	187.70	0.42

Table 2

Means and Standard Deviations of PSIS Data for Experimental and Control Groups

Subscale	Experimental		Control	
	M	SD	M	SD
Anxiety	22.30	5.12	21.06	6.26
Concentration	14.38	3.15	14.44	3.81
Confidence	17.63	7.21	13.09	6.69
Mental Preparation	11.35	2.24	11.22	1.72
Motivation	14.68	6.17	14.81	2.81
Team Emphasis	22.35	2.81	21.09	3.04

Table 3

Mixed Model ANOVA for PSIS Anxiety Subscale

Source	df	MS	F
Between Subjects			
Groups	1	387.51	0.14
Subjects Within Groups	7	2860.37	
Within Subjects			
Trials	7	104.26	0.65
Group x Trials	7	256.86	1.60
Trials x Subjects Within Groups	49	160.04	

Table 4

Mixed Model ANOVA for PSIS Concentration Subscale

Source	df	MS	F
Between Subjects			
Groups	1	1.70	0.00
Subjects Within Groups	7	2558.44	
Within Subjects			
Trials	7	312.19	1.89
Group x Trials	6[a]	392.95	2.38*
Trials x Subjects Within Groups	46[a]	164.83	

[a]Huyn-Feldt Epsilon adjustment.

*$p < .05$.

Table 5

Mixed Model ANOVA for PSIS Confidence Subscale

Source	df	MS	F
Between Subjects			
Groups	1	2183.01	0.82
Subjects Within Groups	7	2662.81	
Within Subjects			
Trials	7	70.00	0.52
Group x Trials	6[a]	408.58	3.02*
Trials x Subjects			
Within Groups	46[a]	135.50	

[a]Huyn-Feldt Epsilon adjustment.

*$p < .05$.

Table 6

Mixed Model ANOVA for PSIS Mental Preparation Subscale

Source	df	MS	F
Between Subjects			
Groups	1	333.51	0.42
Subjects Within Groups	7	798.34	
Within Subjects			
Trials	7	603.70	1.66
Group x Trials	7	290.04	0.80
Trials x Subjects Within Groups	49	362.68	

Table 7

Mixed Model ANOVA for PSIS Motivation Subscale

Source	df	MS	F
Between Subjects			
Groups	1	263.94	0.10
Subjects Within Groups	7	2728.02	
Within Subjects			
Trials	7	212.98	1.15
Group x Trials	7	141.44	0.77
Trials x Subjects Within Groups	49	184.54	

Table 8

Mixed Model ANOVA for PSIS Team Emphasis Subscale

Source	df	MS	F
Between Subjects			
Groups	1	2398.63	1.83
Subjects Within Groups	7	1310.63	
Within Subjects			
Trials	7	71.20	0.23
Group x Trials	7	410.66	1.30
Trials x Subjects Within Groups	49	315.34	

5) subscales. For both subscales, the Huyn-Feldt Epsilon adjustment was used to adjust the df for the critical F values. This adjustment was performed because significant W values resulted from the Mauchly test of sphericity.

Simple main effects for concentration revealed the largest F value for the groups at Trial 6, with experimental group scores greater than control group scores, but the F did not reach statistical significance. Therefore, it was not possible to solve the significant interaction effects for the concentration subscale.

The pattern of confidence scores revealed divergence at Trial 4, which continued through Trial 8. Experimental group subjects rose in confidence, whereas control group subjects declined. Simple main effects revealed statistical significance only at Trial 6, a time period during which individual interventions were added to the group MT sessions.

No significant group main effects were revealed for the other remaining subscales (anxiety, mental preparation, motivation, and team emphasis), which led to the general rejection of Hypothesis 2. The MT program did not result in significant differences in psychological skills between experimental and control group subjects, with the exception of concentration and

confidence.

Mood Data

In Table 9, the means and standard deviations for experimental (n = 5) and control group (n = 4) subjects on the POMS are presented. As shown in the table, the experimental group members reported seemingly lower scores on the following subscales: tension, depression, anger, fatigue, and confusion. In addition, the experimental subjects reported higher scores for the vigor subscale.

The results of the mixed model ANOVAs assessing group and trials effects and Group x Trials interactions on the POMS subscales are presented in Tables 10-15. A statistically significant (.05 level) Group x Trials interaction was apparent only for the fatigue subscale. Because significant W values resulted from the Mauchly test of sphericity, the Huyn-Feldt Epsilon adjustment was used to adjust the df for the critical F values. Simple main effects for fatigue revealed significant group differences only at Trial 5, the end of fall semester classes just prior to examinations.

No significant group main effects were revealed for the tension, depression, anger, vigor, and confusion POMS subscales. Hypothesis 3 was therefore rejected because the experimental group did not show

Table 9

Means and Standard Deviations of POMS Data for Experimental and Control Groups

	Experimental		Control	
Subscale	M	SD	M	SD
Tension	13.13	8.83	18.13	6.80
Depression	11.27	11.00	21.09	12.12
Anger	9.25	8.61	13.09	9.76
Vigor	19.50	6.84	16.22	4.98
Fatigue	8.70	7.46	10.83	5.50
Confusion	9.52	6.49	14.63	4.24

Table 10

Mixed Model ANOVA for POMS Tension Subscale

Source	df	MS	F
Between Subjects			
Groups	1	2988.59	1.76
Subjects Within Groups	7	1695.98	0.98
Within Subjects			
Trials	6[a]	521.72	2.52*
Groups x Trials	7	286.03	1.38
Trials x Subjects Within Groups	42[a]	206.63	

[a]Huyn-Feldt Epsilon adjustment.

*$p < .05$.

Table 11

Mixed Model ANOVA for POMS Depression Subscale

Source	df	MS	F
Between Subjects			
Groups	1	5249.83	2.93
Subjects Within Groups	7	1793.86	
Within Subjects			
Trials	6	209.47	1.06
Group x Trials	7	284.82	1.44
Trials x Subjects Within Groups	49	198.08	

Table 12

Mixed Model ANOVA for POMS Anger Subscale

Source	df	MS	F
Between Subjects			
Groups	1	1503.69	0.84
Subjects Within Groups	7	1789.71	
Within Subjects			
Trials	7	158.09	0.59
Group x Trials	7	391.32	1.47
Trials x Subjects Within Groups	49	267.03	

Table 13

Mixed Model ANOVA for POMS Vigor Subscale

Source	df	MS	F
Between Subjects			
Groups	1	2306.60	1.16
Subjects Within Groups	7	1995.35	
Within Subjects			
Trials	7	96.56	0.40
Group x Trials	7	294.01	1.23
Trials x Subjects Within Groups	49	238.73	

Table 14

Mixed Model ANOVA for POMS Fatigue Subscale

Source	df	MS	F
Between Subjects			
Groups	1	1395.35	0.96
Subjects Within Groups	7	1448.78	
Within Subjects			
Trials	6[a]	558.57	2.47*
Group x Trials	6[a]	576.49	2.54*
Trials x Subjects Within Groups	45[a]	226.56	

[a]Huyn-Feldt Epsilon adjustment.

*$p < .05$.

Table 15

Mixed Model ANOVA for POMS Confusion Subscale

Source	df	MS	F
Between Subjects			
Groups	1	5249.83	4.31
Subjects Within Groups	7	1218.19	
Within Subjects			
Trials	6[a]	586.83	2.75*
Group x Trials	7	323.60	1.52
Trials x Subjects Within Groups	42[a]	213.16	

[a]Huyn-Feldt Epsilon adjustment.

*$p < .05$.

significantly greater mood control than the control group, except for fatigue. The statistically significant (.05 level) trials effects apparent for the tension and confusion subscales were relatively meaningless to the central purposes of the study and, therefore, no pairwise contrasts were made.

Opinions of Players

Overall, the athletes responded favorably to the MT program. All experimental subjects reported that they enjoyed the MT exercises, and three (60%) stated that the exercises helped them improve their performances in basketball. All subjects indicated that MT should be incorporated in future years but should involve the entire team.

Summary

This chapter contained statistical analyses of the basketball performance, PSIS, and POMS. Opinions were also gathered from experimental group subjects about the MT program. There were no group differences in the basketball performance statistics, therefore the MT program was not seen as effective in altering performance.

Significant between group differences were only found for particular trials on the concentration and confidence subscales of the PSIS. Generally, the MT program was relatively ineffective in developing

psychological skills.

Experimental group subjects reported lower scores on the fatigue subscale of the POMS at a particular trial, but no other between group differences existed. Therefore, the MT program did not enhance experimental group subjects' mood control throughout the study.

The subjective reactions of the experimental group members to the value of the MT program showed that three (60%) of the athletes indicated that it enhanced their basketball performance. All experimental group subjects indicated that the MT program should be incorporated into the basketball training in future years.

Chapter 5

DISCUSSION OF RESULTS

The contents of this chapter include a discussion of the results of this investigation. The investigator will present logical reasons for the results and inform the reader how the findings compare with those of other researchers. Topics include (a) basketball performance data, (b) psychological skills data, (c) mood data, (d) opinions of players, and (e) summary.

Basketball Performance Data

Game statistics used in the statistical analysis were compiled during actual intercollegiate competitions. An examination of the descriptive statistics presented in Table 1 shows that the experimental group members revealed seemingly higher performances on all the game statistics. However, these differences were not statistically significant.

Failure to obtain statistically significant differences in basketball performance may be due to a combination of two factors. First, when working with small sample sizes, it is difficult to obtain statistical significance. Secondly, overall, the control group was relatively homogenous. In other words, all four members of the group acquired similar amounts of playing time and other game statistics

throughout the season. However, the same situation did not exist for the members of the experimental group. With this group, four of the five members played a similar amount of time for the entire season. Thus, they had similar opportunities to accumulate game statistics. The fifth player, however, acquired the least amount of playing time of all subjects in both groups. The inclusion of this player's data in the statistical analysis may have influenced the significance of the outcomes by increasing the heterogeneity of the experimental group's data.

As indicated in chapter 2, several researchers have investigated the relationship between mental skill development and basketball performance (e.g., Burton, 1989; Kolonay, 1977; Meyers & Schleser, 1980). In these studies, a variety of MT techniques were investigated and implemented. Some of these techniques were goal setting, VMBR, relaxation, imagery, cognitive interventions, and visualization. Statistically significant improvements in basketball performance were demonstrated in 5 of the 12 studies. For example, Burton's (1989) specific goal subjects performed significantly better than general goal subjects on defensive footwork and ball handling skills. However, as noted, game statistics were not used as the measure of basketball performance in his investigation.

Other researchers have also found statistically significant basketball performance improvements resulting from the application of various MT strategies (Hall & Erffmeyer, 1983; Kendall et al., 1990; Silva, 1979). Basketball performance was measured using a game statistic (free throw shooting) in a controlled environment in one of these studies (Hall & Erffmeyer, 1983). In the other two studies, performance was measured using subjective observation of fundamental basketball skills. Although numerical data were collected for these skills (e.g., cutting off baseline, defensive footwork, and ball handling), performance was based on subjective evaluation of the respective skills. In contrast to subjective assessment, the collection of game statistics is almost purely objective. The investigator in the present study assumed that most basketball statisticians are unaware that their statistical information is being utilized in an investigation and have no desire to skew the results of an experiment. Thus, they would not bias their collection of basketball statistics. It is possible, however, that the individuals subjectively evaluating basketball skills may be influenced by the demand characteristics of the experimental situation and skew the data to meet those expectations.

With respect to Hall and Erffmeyer (1983), Kendall

et al. (1990), and Silva (1979), it is important to highlight their data collection procedures. In all three studies, data collection occurred in controlled testing environments rather than naturalistic settings of actual game situations. Typically, there are certain factors inherent in an interscholastic or intercollegiate basketball competition that are impossible to reproduce in a laboratory.

Previous research that utilized game statistics as the measure of basketball performance are most relevant here. The results of this investigation are similar to previously cited studies. Other investigations of MT interventions have demonstrated improvements in basketball performance, as measured by game statistics, but, in general, these findings were not statistically significant (Crossman, 1984; Kendall et al., 1990; Meyers et al., 1982; Smith, 1987b). For example, Crossman and Smith investigated intercollegiate basketball players and both reported improvements in basketball performance as measured by game statistics in actual collegiate competition. However, these improvements were not found to be statistically significant. Thus, it appears as though these two studies were similarly plagued with the obstacle of small sample sizes. Sample sizes for Smith and Crossman were $\underline{N}$ = 12 and $\underline{N}$ = 10, respectively. Despite

this lack of statistical significance, the athletes in both studies perceived the MT strategies to be helpful in enhancing performance. In conclusion, it seems that the performance related findings of the present investigation mirror the findings of other studies with similar sample sizes.

In a study utilizing a larger sample, Kolonay (1977) demonstrated statistically significant improvements in basketball performance, as measured by game statistics. In her investigation, it appears as though the sample size (N = 72) was large enough to adequately test for statistically significant results.

Similar results were reported by Meyers and Schleser (1980). Using a case study design, the researchers reported statistically significant improvements in field goals made, total points per game, and field goal percentages. However, it may be that these increments in performance were a result of the Hawthorne effect rather than the experimental condition. Concern for this effect is particularly important because of the nature of the case study design. With respect to the present study, it seems that the Hawthorne effect did not affect improvements in the basketball performance of the experimental group. Thus, it seems that the major contributing factor to the lack of statistical significance with the

present study is small sample size.

It is apparent, as other researchers have suggested, that basketball performance is multidimensional in nature (Meyers & Schleser, 1980). A variety of factors may influence the performance equation. Some of these factors are playing opportunity, opponent strength, playing position, and individual motivation. When performing investigations in naturalistic settings, such as the present one, researchers must relinquish their control over some of these factors. This reduction in control has a direct impact upon the outcomes of empirical research. In this study, all subjects did not have qualitatively or quantitatively equivalent opportunities to perform.

Psychological Skills Data

As presented in chapter 4, there were no statistically significant group differences for anxiety, mental preparation, motivation, or team emphasis. Thus, the experimental group did not show greater development of psychological skills than their controls. Statistically significant Group x Trials interactions were revealed for the concentration and confidence subscales.

Inspection of simple main effects for concentration showed the largest difference between the experimental and control group scores occurred at Trial

6. Because this difference was not statistically significant, it was not possible to solve the significant Group x Trials interaction effect.

Although simple main effects demonstrated a statistically significant Group x Trials interaction difference only at Trial 6, the data revealed a gradual increase in the level of confidence of the experimental group beginning at Trial 4 and continuing throughout the study. This elevation was associated with a gradual decline in the confidence of the control group between Trials 4 and 8. Thus, the researcher concluded that the MT program involving group sessions and individual interventions played a role in the development of confidence in the experimental group. This finding is encouraging with respect to the impact of the MT program in this study. It appears as if the combination of MT components enhanced the effectiveness of the MT program. This lends support to previously cited researchers who suggested that individual MT components may be most effective when used in conjunction with other strategies.

The relationship between Trial 6 and the increase in confidence levels of experimental group members may perhaps also be linked to the effects of the individual interventions. Trial 6 occurred after initial individual interventions had been in effect for 4

weeks. During individual intervention meetings, experimental subjects were provided with both positive and constructive feedback regarding their basketball performance. The increase in personal attention from the coach, the researcher, and the sport psychology consultant during the interim between Trials 5 and 6 apparently impacted confidence levels.

These findings are not inconsistent with those of other researchers. Smith (1987b) found that his imagery program did not significantly alter the self-reported trait anxiety, state anxiety, and self-confidence levels of collegiate basketball players (N = 12). Despite this lack of statistical significance, Smith reported a positive trend in the self-confidence of his subjects. In addition to this, both the coaches and athletes subjectively perceived that the program aided the athletes' performances.

It has been difficult for the researcher to locate studies that report the relationship between MT programs, collegiate basketball performance, and psychological skill development. In the majority of the empirical research, objective measures have been limited to physical performance data. Research on the development of psychological skills, such as those defined by the subscales of the PSIS, has been greatly limited (e.g., Smith, 1987a). Despite this lack of

objective measurement, many researchers have included the subjective perceptions of subjects with respect to the development of psychological skills (Crossman, 1984; Kendall et al., 1990; Miller & McAuley, 1987; Meyers et al., 1982). In all four studies, the researchers reported anecdotal evidence, collected from treatment subjects, that supports the efficacy of each intervention investigated. The relationship between MT, performance, and subjective evaluations will be more thoroughly discussed in a subsequent section of this chapter.

Mood Data

According to the results reported in chapter 4, there were no statistically significant between group differences on 5 of 6 POMS subscales. Generally, the experimental group did not show greater mood control than the control group throughout the study. A statistically significant Group x Trials interaction was apparent only for the fatigue subscale at Trial 5.

The results of this study regarding the influence of MT strategies and mood control are not supported by previous research. Of the myriad of studies reviewed in chapter 2, not one investigated the relationship between basketball performance, MT strategies, and mood control. In fact, mood control, as defined by the subscales of the POMS (e.g., tension, depression,

fatigue, etc.), was mentioned in only one study reviewed. Nideffer and Deckner (1970) applied their MT program to a college male shot putter. The program was designed to help the athlete control his precompetitive tension levels. However, the researchers did not report any tests assessing these levels. Due to the dearth of research literature regarding the relationship between mood control, basketball performance, and MT, it is necessary to focus on the theoretical literature.

The impact of mood control on athletic performance has been demonstrated by its inclusion as a component in every MT package reviewed in chapter 2. All authors discussed the relative importance of arousal and emotional control with respect to performance states. The primary MT technique presented by these authors to achieve this goal was relaxation training. It has been suggested that relaxation training enables athletes to recognize their own levels of arousal (Singer, 1982). According to Curtis (1988), relaxation training serves two functions: (a) to prepare athletes for mental imagery, and (b) to facilitate the development of self-regulation skills. The purpose of relaxation training in the present investigation was to function in both capacities.

The importance of self-regulatory skills in

athletics is readily apparent. However, relaxation training is not the only means of enhancing self-regulatory skills. Other techniques are cognitive thought stopping, positive thought control, problem solving, psychological assessment, and stress management. Researchers have noted that the POMS was initially developed to assist clinicians in assessing changes resulting from the use of various psychotherapies and psychotropic medications (Auweele, Cuyper, Van Mele, & Rzewnicki, 1993). The function of the POMS in the present study was twofold. Its primary function was to assist the researcher in "tracking" the mood disposition of subjects throughout the length of the study. An auxiliary purpose for the POMS was to act as a diagnostic tool. Information obtained from the POMS scores was used in developing and assessing the effectiveness of the individualized interventions. Results from each measurement of the PSIS and the POMS were presented to experimental group athletes and were utilized as feedback. Thus, both the POMS and the PSIS were used in conjunction with relaxation training to assist athletes in developing self-regulation skills.

A variety of researchers have incorporated the use of the POMS with nonpsychiatric samples. The most published researcher utilizing the POMS with athletic samples has been Morgan (1968, 1972, 1974, 1978, 1979,

1980). The POMS has been demonstrated to be useful in the prediction of athletic success (Morgan, 1972, 1974, 1978, 1979, 1980; Morgan & Johnson, 1977, 1978). Through his research on the POMS and the elite athlete, Morgan (1978) has developed a profile that he suggests is appropriate for optimal functioning. In his mental health model of athletic performance, Morgan suggests that athletic success is positively correlated with more positive mental health profiles. Morgan's renowned "iceberg profile" refers to the visual display of an athletes' POMS data. Specifically, the tension, depression, anger, fatigue, and confusion scores are below the 50th percentile and the vigor scores appear above the 50th percentile of published norms. Theoretically, Morgan's assertion is appealing because of its common sense approach.

Few people would argue that psychopathological individuals are more likely to perform better than their mentally healthier counterparts. Gill (1986) noted that psychopathology is negatively related to success in most achievement situations. Thus, it should not be astounding that this relationship exists within the athletic realm as well. Although support for the iceberg profile has been demonstrated in several studies (Morgan & Pollock, 1977), it is important to note that a causal relationship has not

yet been established. In other words, it is not known whether the positive mood states cause success in sport, or whether success in sports causes positive mood states.

Auweele et al. (1993), in a review of the research literature incorporating the use of the POMS, found that the majority of the studies involved elite American male athletes. In their closing remarks, the researchers concluded that elite American athletes generally displayed the iceberg profile. Additionally, it appeared that this profile was especially noticeable during precompetition training periods. This finding lends support to Morgan's (1978) contention that it may be the athlete's psychological response to training, rather than her/his baseline measures that impact performance. However, the researchers cautioned readers about generalizing these results to other populations. With few exceptions, the studies reviewed by Auweele et al. utilized elite American male athletes as their subjects. Thus, the present study has dual significance. It provides researchers with information regarding the mood profiles of female collegiate athletes. This investigation also supplies a systematic description of athlete mood states throughout a competitive season.

Although the MT package applied in the present

investigation did not result in significant differences between the overall mood of the experimental and control group subjects, it does provide valuable information regarding the use of the POMS as a monitoring device throughout a competitive season. For example, the location of a significant Group x Trials interaction for the fatigue subscale during Trial 5 may perhaps provide coaches, athletes, and sport psychologists with facts regarding environmental and stress related conditions at that time. The fifth data assessment occurred during the semester break of the academic year. This period was a time of intensive emphasis on basketball during which the athletes had no academic responsibilities or concerns. Prior to that assessment date, the subjects had been involved in 7 consecutive days of double basketball practice sessions (i.e., they practiced twice a day). Coaches generally subjectively assess fatigue levels of their athletes in order to determine levels of conditioning and readiness. However, the POMS provided a more objective assessment of fatigue levels at this time. Experimental group subjects displayed significantly lower fatigue scores than control subjects. Additionally, the experimental group members had been involved in two MT sessions, and individual interventions had been designed and implemented by the

fifth trial. Apparently, the MT program enabled the experimental group members to better manage their fatigue levels at this time.

One factor influencing mood control in this study focuses on the frequency of practicing MT techniques. Certainly, the greater number of group MT sessions during the semester break (fifth assessment) may have influenced the effectiveness of the treatment condition at that time. Also, treatment subjects were more likely to practice MT techniques when they had fewer academic stressors to occupy their thoughts.

Opinions of Players

All experimental subjects enjoyed using MT exercises. Additionally, 60% perceived that the MT program enhanced their basketball performance. The opinions of the experimental group members in the present investigation are similar to others involved in MT interventions. In one study, Miller and McAuley (1987) investigated the effects of a goal setting program on basketball free throw self-efficacy and performance. The intervention involved weekly (5 weeks) 10-min teacher-lead conferences with the goal trained subjects. Participants in the study (N = 18) were undergraduate males enrolled in a beginning basketball class. All subjects completed inventories assessing their own perceived degree of success and

self-efficacy. This was done weekly after they completed 20 free throws. Although the free throw accuracy of the goal-trained subjects did not improve significantly, they did have significantly higher perceptions of both success and self-efficacy.

The extent to which these findings will generalize to athletes in actual competitive situations is perhaps questionable. However, utilizing a closed skill such as free throw shooting allows investigators to exert greater control over the experimental situation. This type of research design enables the investigator to decipher more easily the influence of the intervention on the performance outcome, without all of the supplemental influences inherent in a naturalistic setting. Nonetheless, it does show that a MT intervention program can significantly influence the individual perceptions of success and self-efficacy of college males. In addition, this study demonstrates a need for future investigations to evaluate both physical and psychological performance measures. Miller & McAuley (1987) stressed the importance of collecting both subjective and objective measures of success.

In many athletic situations, subjective perceptions of success are evaluated naturally. It is not uncommon to hear coaches, parents, friends, and

others discuss individual performances with athletes. These discussions are known to occur during pre- and postgame conditions. Despite the informal and highly subjective nature of such data collection techniques, coaches regularly utilize the information gained as insight into athletes' levels of motivation, confidence, anxiety, concentration, and mental preparedness. Coaches who are able to accurately evaluate the general disposition of players and effectively incorporate the information will be more likely to influence performance outcomes. The importance of this relationship appears to be founded in common sense. However, this relationship has been empirically examined. "The attitude/behavior relationship and the related applied question of how to change attitudes in order to change behavior are the central issues of most social psychology attitude research" (Gill, 1986, p. 100). Thus, the findings of Miller & McAuley (1987) are quite significant with respect to behavioral change and/or influence.

In the present investigation, it is important to note the potential impact of demand characteristics on the experimental situation. The influence of demand characteristics with any experiment can be covert or overt. In investigations in which subjects remain blind about the potential effects of the treatment

condition, the influence of demand characteristics is more likely to be covert. In other words, experimenters may subconsciously allow their expectations to be known through their behaviors such as praise, reinforcement, or treatment of subjects. The present investigation was different. It was deemed necessary that the treatment subjects have a belief in the value of MT and the willingness to commit to the program. Therefore, the researcher overtly attempted to make her expectations known. Previous researchers have stated that belief in MT is the foundation of its effectiveness (Harris & Harris, 1984). Smith (1987a) also proposed that athletes' attitudes and expectations are conditions that facilitate sport imagery training. He suggested that imagery may be most beneficial for those who believe in its value. Thus, it seemed necessary to demonstrate and facilitate a belief in the performance enhancing potential of the MT program.

Some issues not yet discussed regarding the influence of demand characteristics in this study are the thoughts and beliefs of the players about the value of MT. As was indicated in chapter 3, the subjects who were placed in the treatment group responded most favorably to questions assessing the value of and their beliefs towards the importance of MT. Using this selection criterion, rather than random sampling,

created an experimental situation in which the demand characteristics and expectations of the researcher were clearly understood. Additionally, the sampling procedure resulted in a biased sample. In much experimental research, investigators attempt to keep subjects blind about the potential effects of the treatment condition. This control, it is hoped, allows the researchers to conclude whether the experimental condition was responsible for the results. By sampling according to beliefs and willingness to participate, this researcher chose to give up some of this control.

Demand characteristics and individual perceptions can have a profound impact on experimental outcomes. Experimental group subjects perceived the MT program to enhance their performance in the athletic domain. Opinion information collected in the present investigation was not subjected to statistical analyses. However, previous researchers have demonstrated statistically significant improvements in perceptions of success and feelings of self-efficacy as a result of MT interventions (Miller & McAuley, 1987). Thus, it appears that the role of individual perceptions in the performance equation cannot be discounted.

Summary

The lack of statistically significant differences

between experimental and control group subjects' basketball performance was discussed in detail in this chapter. Perhaps the most significant impact on the experimental results was sample size. Research has shown statistically significant improvements in basketball performance, as measured by game statistics (Kolonay, 1977). In contrast, investigations utilizing sample sizes similar to the present investigation have shown results that mirror those found here (Crossman, 1984; Kendall et al., 1990; Meyers et al., 1982; Smith, 1987b).

In the present study, group main effects were not apparent for the PSIS subscales of anxiety, mental preparation, motivation, and team emphasis. As demonstrated by the confidence interaction, the MT program significantly enhanced experimental group levels while the confidence of the control group declined throughout the study. Although the significant concentration interaction was not able to be resolved, the experimental group data showed a trend of increasing concentration scores throughout the study. Smith (1987b) reported a similar trend in his analyses of self-reported trait and state anxiety and self-confidence. As with the present investigation, Smith's study was similarly plagued with small sample size.

Statistically significant group main effects were not apparent for the following POMS subscales: tension, depression, anger, fatigue, and confusion. However, a statistically significant Group x Trials interaction revealed a pattern of the experimental group displaying lower levels of fatigue than the control group.

The discussion on the mood data focused on the purpose of the POMS in the present investigation. POMS assessments have been extensively utilized by previous researchers as a means of predicting athletic success (e.g., Morgan, 1968, 1972). As noted, the POMS provided the researcher with two functions. The POMS results, in conjunction with PSIS assessments and relaxation training, were utilized to enhance experimental subjects' development of self-regulatory skills. Additionally, the POMS provided the researcher with a collection of quantitative data that illustrated season-long mood control of intercollegiate female athletes.

In summary, the results of the present investigation demonstrate a need for additional research in the area of MT and basketball performance. Most notably, future researchers must strive to utilize large samples in their studies. Despite the lack of statistical significance in athletic performance and

the general lack of significance in psychological skill development and mood control, the MT program produced some positive trends and favorable results.

Chapter 6

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study investigated the effects of MT on basketball performance, psychological skills, and mood control. The PSIS and the POMS were administered to 12 members of an NCAA Division III women's basketball team at various points throughout the season. Subjects were divided into treatment and control groups with the former being exposed to a season-long MT program. The MT program consisted of instruction and practice in the following techniques: relaxation training, affirmation statements, mental recall and rehearsal, concentration training and goal setting. Season game statistics and repeated measures of the PSIS and the POMS provided data to assess the impact of the experimental condition.

The results of the one-way ANOVA showed no statistically significant group differences between experimental and control groups for any basketball statistic. Thus, the season-long MT program did not produce significant differences in the basketball performance of experimental and control group members.

PSIS data were analysed using a mixed model ANOVA. Results indicated significant Group x Trials

interaction effects for only the concentration and confidence subscales. The pattern of the data showed a gradual increase in the experimental group's confidence paired with a gradual decrease in the control group's level of confidence throughout the study.

The mixed model ANOVA of the POMS data revealed a significant Group x Trials interaction only for the fatigue subscale. Results showed a statistically significant group difference for a single trial and demonstrated a trend toward lower fatigue scores for the experimental group subjects.

Conclusions

The results of this investigation yielded the following conclusions regarding the relationship among MT, basketball performance, psychological skills, and mood control:

1. MT is a promising basketball performance enhancing technique for collegiate basketball players.

2. The use of MT techniques produces positive trends in the development of concentration and confidence.

3. MT strategies have a positive impact on control of fatigue levels.

4. Basketball players using MT techniques demonstrate minimal changes in their levels of psychological preparation and mood control.

Recommendations

The following recommendations for further study were made after the completion of this investigation:

1. A large scale study utilizing weighted game statistics in relation to minutes played should be conducted with athletes similar to those who participated in the present study.

2. The predictive abilities of the POMS should be investigated using amateur athletic populations and statistical measures of performance.

3. The relative predictive abilities of the PSIS and the POMS on basketball and other sport performance should be investigated.

4. Investigations of performance enhancing techniques should involve collecting physical, psychological, and mental evaluations of performance.

Appendix A

INFORMED CONSENT FORM

The purpose of this study is to determine the effects of weekly mental training sessions on the athletic performance, psychological adjustment, and mood of collegiate female basketball players. Information gained from this study will help researchers to determine the effectiveness of different aspects of mental training relative to the variables of interest.

This study has been designed to enhance the knowledge of psychological phenomena as they relate to the sport-specific situation. It is not the intent of the researchers to subject participants to any physical or psychological stresses as a result of their participation. You may, at any point in this study, choose to withdraw from participation. Subjects will be randomly assigned to control and experimental groups. Experimental subjects will participate in weekly mental training sessions. All subjects will be asked to complete questionnaires on separate occasions throughout the study. All data collected in this study will remain confidential and will not be reported in raw form.

I have read the above information, I understand

its contents, and I agree to participate in the study. I acknowledge that I am 18 years of age or older.

_____

(Signature)

_____

(Date)

Appendix B

MENTAL TRAINING QUESTIONNAIRE

Name: _____

Date: _____

Please indicate your responses to the following questions.

1. How strongly do you believe in the value of mental training for athletes?

0	not at all
1	
2	
3	somewhat
4	
5	moderately
6	
7	important
8	
9	
10	great value

2. How excited are you about participating in mental training exercises?

0	not at all
1	
2	
3	somewhat
4	
5	moderately
6	
7	excited
8	
9	
10	very excited

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